

CLAIMS

Now, therefore, the following is claimed:

1. An immunological assay system, comprising:

5 a vessel capable of containing an assay sample and a reagent, wherein the vessel comprises a bottom with an uneven surface.

2. The immunological assay system of claim 1, further comprising an incubator in which the vessel may be placed, wherein the incubator houses the vessel while the assay sample and the
10 reagents react.

3. The immunological assay system of claim 1, further comprising a sample separation system in close proximity to the incubator, wherein the sample separation system is designed to separate the assay sample and the reagents into various components.
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4. The immunological assay system of claim 1, further comprising an image acquisition system in close proximity to the sample separation system, wherein the image acquisition system is designed to detect the presence of interactions between components in the assay sample and a reagent.
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5. The immunological assay system of claim 1, further comprising a robotic pipettor including a robotic arm within reaching distance of the vessel, the incubator, the sample separation system and the image acquisition system, wherein the robotic pipettor is designed to transfer the assay sample or the reagents between the vessel, incubator, the sample separation
25 system and the image acquisition system.

6. The system of claim 1, wherein the bottom of the vessel comprises a filter material selected from a polypropylene, a nylon, a cellulose nitrate, and polyvinylidene fluoride.

7. The system of claim 1, wherein the bottom of the vessel comprises a filter material selected from polypropylene with 0.45 micron (μm)-sized pores; cellulose nitrate with 0.45 μm -sized pores; nylon 6,6 with 0.45 μm -sized pores; nylon 6,6 with 1.2 μm -sized pores; HPVM membrane with 0.2 μm -sized pores; polyvinylidene fluoride (PVDF) with 1.0 μm -sized pores; 5 PVDF with 1.2 μm -sized pores; PVDF with 0.2 μm -sized pores; and PVDF with 0.25 μm -sized pores.

8. The system of claim 1, wherein the sample separation system is a centrifuge.

10 9. The system of claim 1, wherein the image acquisition system is a flow cytometer or a capillary cytometer.

10. The system of claim 1, wherein the assay sample comprises red blood cells and antibodies.

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11. The system of claim 1, further comprising means for spreading the reacted sample and reagent components evenly over the bottom surface of the vessel.

12. The system of claim 11, wherein the means for spreading the reacted sample and reagent 20 components evenly over the bottom surface of the vessel is a centrifuge.

13. The system of claim 1, further comprising means for analyzing the reacted components on the bottom surface of the vessel.

25 14. The system of claim 13, wherein the means for analyzing the reacted components is a flow cytometer or a capillary cytometer.

15. An immunological assay system, comprising:

a reaction vessel;

a dilute concentration of an immunohematological sample;

a dilute concentration of a reagent; and

5 a flow cytometer or a capillary cytometer.

16. The system of claim 15, further comprising a vacuum filtration system.

17. The system of claim 15, further comprising a centrifugation system.

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18. The system of claim 15, wherein the immunohematological sample comprises at least one of red blood cells, antigens, and alloantibodies.

19. The system of claim 15, wherein the reagent comprises at least one of an antibody and
15 patient plasma.

20. The system of claim 15, wherein the system detects at least one of A-antigen, B-antigen, Rh(D)-antigen, Kell antigen, Duffy antigen, antibody, and alloantibody.

20 21. The system of claim 15, wherein the system detects at least two of A-antigen, B-antigen, Rh(D)-antigen, Kell antigen, Duffy antigen, antibody, and alloantibody.

22. The system of claim 15, wherein the system detects at least three of A-antigen, B-antigen, Rh(D)-antigen, Kell antigen, Duffy antigen, antibody, and alloantibody.

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23. An immunological assay method comprising:
providing a vessel having a bottom with an uneven surface;
reacting an immunological sample and a reagent mixture in a vessel;
centrifuging the sample and reagent mixture; and
5 analyzing the components in the vessel to determine the presence of interactions between
the sample and reagent components.
24. The method of claim 23, wherein the centrifugation is at low speed.
- 10 25. The method of claim 24, wherein the centrifugation at low speed comprises centrifugation
at a maximum rate of approximately 1,000 g.
26. The method of claim 24, wherein the centrifugation at low speed comprises centrifugation
at a rate from approximately 250 g to approximately 400 g.
- 15 27. The method of claim 23, further comprising separating from the vessel any portion of the
sample and reagent mixture that did not react.
28. The method of claim 23, further comprising incubating the sample and reagent mixture.
- 20 29. The method of claim 23, wherein the sample and reagent mixture comprises red blood
cells and antibodies.
30. The method of claim 23, wherein the uneven surface causes the interacted components in
25 the sample to spread evenly over the bottom surface of the vessel during centrifugation, without
migrating to a single area within the vessel.
31. The method of claim 23, wherein the vessel comprises a filter including
an inert material, and
30 a plurality of pores.

32. The method of claim 31, wherein the filter comprises a material selected from a polypropylene, a nylon, a cellulose nitrate and polyvinylidene fluoride.

33. The method of claim 31, wherein the filter comprises a material selected from the group consisting of: polypropylene with 0.45 micron (μm)-sized pores; cellulose nitrate with 0.45 μm -sized pores; nylon 6,6 with 0.45 μm -sized pores; nylon 6,6 with 1.2 μm -sized pores; HPVM membrane with 0.2 μm -sized pores; polyvinylidene fluoride (PVDF) with 1.0 μm -sized pores; PVDF with 1.2 μm -sized pores; PVDF with 0.2 μm -sized pores; and PVDF with 0.25 μm -sized pores.

34. The method of claim 23, wherein the components are analyzed via a flow cytometer or a capillary cytometer.

35. The method of claim 23, wherein the centrifugation is for a short period of time.

36. The method of claim 23, wherein the centrifugation is for a maximum time of approximately 1 minute.

37. The method of claim 23, wherein reacting the sample and reagent mixture comprises incubating the sample and reagent mixture.

38. The method of claim 23, wherein the centrifugation is at low speed and for a short period of time.

39. An immunological assay method, comprising:
mixing a diluted immunohematological sample with a diluted reagent to form a sample mixture;
analyzing the sample mixture via flow cytometry; and
5 determining whether a predetermined component is present in the immunohematological sample.

40. The method of claim 39, wherein the immunohematological sample comprises at least one of red blood cells, antigens, and alloantibodies.

41. The method of claim 39, wherein the reagent comprises at least one of an antibody and patient plasma.

42. The method of claim 39, wherein the predetermined component is at least one of A-antigen, B-antigen, Rh(D)-antigen, Kell antigen, Duffy antigen, antibody, and alloantibody.

43. The method of claim 39, wherein the predetermined component is at least two of A-antigen, B-antigen, Rh(D)-antigen, Kell antigen, Duffy antigen, antibody, and alloantibody.

44. The method of claim 39, wherein the predetermined component is at least three of A-antigen, B-antigen, Rh(D)-antigen, Kell antigen, Duffy antigen, antibody, and alloantibody.

45. The method of claim 39, further comprising:
spreading the sample mixture over a bottom surface of a reaction vessel through vacuum
25 filtration.

46. The method of claim 39, further comprising:
spreading the sample mixture over a bottom surface of a reaction vessel through low speed centrifugation.